

EXHIBIT 4

PUBLIC REDACTED VERSION

ATTORNEYS' EYES ONLY

Page 1

1 UNITED STATES DISTRICT COURT
 2 NORTHERN DISTRICT OF CALIFORNIA
 3 SAN FRANCISCO DIVISION

4 IN RE GOOGLE PLAY STORE : Case No.
 5 ANTITRUST LITIGATION : 3:21-md-02981-JD

6 This Document Relates To:

7 State of Utah et al. v.

8 Google LLC et al.

9 Case No. 3:21-cv-05227-JD

10 Match Group, LLC et al. v.

11 Google LLC et al.

12 Case No. 3:22-cv-02746-JD

13 Epic Games Inc. v. Google

14 LLC et al.

15 Case No. 3:20-cv-05671-JD

16 In Re Google Play

17 Consumer Antitrust

18 Litigation

19 Case No. 3:20-cv-05761-JD

20 ** ATTORNEYS' EYES ONLY **

21 TUESDAY, APRIL 4, 2023

22 Video Recorded and Remote Zoom

23 Deposition of HAL J. SINGER, Ph.D., taken
 24 pursuant to Notice, at the law offices of
 25 Munger, Tolles & Olson LLP, 601 Massachusetts
 Avenue NW, Washington, DC, commencing at
 approximately 9:11 a.m., on the above date,
 before Rose A. Tamburri, RPR, CM, CCR, CRR,
 USCRA Speed and Accuracy Champion and Notary
 Public.

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I N D E X

TESTIMONY OF: HAL J. SINGER, Ph.D.

By Mr. Raphael.....7, 423

By Ms. Giulianelli.....423

E X H I B I T S

EXHIBIT NO.	DESCRIPTION	PAGE NO.
DX-1112	Merits Reply Report of Hal J. Singer, Ph.D.	6
DX-1113	University of Utah Campus Directory	20
DX-1114	Logit Chapter from Kenneth Train Textbook	92
DX-1115	Apple Slide Deck - Bates Nos. DX-4526.001 - 138	253
DX-1116	Daniel L. McFadden Nobel Prize Lecture, December 8, 2000	410

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DEPOSITION SUPPORT INDEX

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DIRECTION TO WITNESS NOT TO ANSWER

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None

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REQUEST FOR PRODUCTION OF DOCUMENTS

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Page Line Description

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None

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STIPULATIONS

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None

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PREVIOUSLY MARKED EXHIBITS REFERRED TO

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1 And do you get compensated in any
2 way for the amount that Econ One bills for the
3 staff time that was spent on this matter?

4 A. Yes.

5 Q. And how does that work?

6 A. So in -- in general, I keep a
7 percentage of the billings of the -- of the
8 staff who are beneath me, who are working in
9 support of me, yes.

10 Q. And what percentage is that?

11 A. So, in general, it's 30 percent,
12 but -- but with -- with the -- with the
13 exception of the -- of the fairly senior level
14 person, I'm keeping 20 percent.

15 Q. Okay.

16 And so just total compensation for
17 your work in this matter, both your work
18 personally, as well as your share of the
19 staff's work, do you have any estimate of
20 that?

21 A. I do not.

22 Q. Do you think it's more or less than
23 \$2 million?

24 A. My personal compensation? I don't
25 think it's \$2 million, no.

1 alternatively, the overcharge can take the
2 form of a suppressed subsidy.

3 I just want to make sure -- I
4 couldn't tell if your question allowed for
5 that -- that second one.

6 Q. Understood. I appreciate that.

7 Let's just -- let's talk about
8 the -- the overcharge side, setting aside the
9 subsidy for a moment. Okay?

10 A. To be clear, they're both
11 overcharges, right, but -- but I -- I think
12 I'm -- I think I get your drift. But you'll
13 -- how about we'll talk about take rate side.

14 Q. Well, you know, I'm not going to say
15 the take rate side, but I'll -- I'll get to --
16 I appreciate the clarification.

17 MS. GIULIANELLI: This could take
18 all day. Objection.

19 MR. RAPHAEL: I appreciate your
20 clarification. I will -- I'll ask questions
21 so I'm not confusing you. Okay?

22 THE WITNESS: All right. Okay.

23 BY MR. RAPHAEL:

24 Q. So if a consumer purchased an app, a
25 subscription or an in-app purchaser from a

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1 developer --

2 A. Um-hmm.

3 Q. -- and that developer would not have
4 lowered its prices if it paid lower service
5 fees, setting aside your subsidy model, that
6 consumer was not overcharged as to that
7 purchase?

8 A. Well, I think you're -- you're asking
9 me to assume if there are no damages, then
10 there are no damages, and I think -- which is
11 tautological. But -- but we -- my model and
12 my view of the world is that every developer
13 will, particularly over the long run, reduce
14 its prices in response to reduction in its
15 costs. That's -- that's my hopefully very
16 uncontroversial view; right?

17 So I have to respectfully dis --
18 reject the assumption that's baked in that --
19 that this developer for some reason defies
20 economics, defies empiricism and pockets
21 100 percent of the take rate reduction. I
22 think that's what you're asking me to assume.

23 But what I'll grant you is that if
24 you -- if you're willing to make those
25 uneconomic assumptions, that -- that -- that

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1 certain developers defy economics and pocket
2 100 percent of the take rate, then when you go
3 down the take rate path, you won't get to
4 damages.

5 Q. Okay.

6 So your opinion is that all
7 developers, if they experience a service fee
8 reduction, will lower the price of their
9 product to consumers?

10 A. I'd like to put -- give a little more
11 granularity to the hypothetical 'cause the --
12 the way that you phrased it, you could have a
13 take rate reduction for a day touching one
14 percent of your revenues, right?

15 So I just want to make sure that
16 if we can rule out, kind of, silly scenarios
17 and talk about a sustained -- in my but-for
18 world, we're talking about the advent of
19 competition, you know, Circa 2009, 2010, they
20 weren't talking about a sustained long-term
21 reduction in take rate.

22 And it is my view that every
23 developer under those circumstances, long-term
24 touching all of their revenues, felt by
25 everyone, then I do think economics would

1 this transaction to be consummated on this
2 alternative platform, and I don't want you to
3 go there because you -- you love me; I want to
4 go -- I want you to go there because you're
5 going to be better off, too, so here's a
6 portion, right?

7 That -- that is the, kind of, the
8 natural mechanism that's going to facilitate
9 pass-through in steering -- pass-through in
10 the but-for world, but it is not necessary.

11 Q. Just so we're clear, steering is not
12 a necessary condition to pass-through in your
13 view?

14 A. I think I can't say it any
15 differently. It's not strictly necessary, but
16 it is certainly helpful.

17 Q. I just want to make sure I'm clear on
18 the Logit model.

19 If there were one transaction
20 involving a dating app and 100 transactions
21 involving all apps in the dating category, you
22 calculate the pass-through rate by dividing
23 one by 100 to get one percent share; right?

24 A. I may have missed it, but I take for
25 each developer, I calculate its share, right,

1 within a given year or a given time period
2 within the category.

3 Q. Right.

4 A. That is correct, okay, but I couldn't
5 tell that from your -- from your hypothetical.

6 Q. Right.

7 So maybe I'll just cut through it
8 and say it's true, under your Logit model for
9 pass-through, that each developer's
10 pass-through rate is the inverse of their
11 share of their category?

12 A. It's one minus the share. Not quite
13 the inverse, but one minus the share of
14 their -- of their category, that's right.

15 Q. And so the only way that an app's
16 pass-through rate would be -- would be zero is
17 if the app had a 100 percent share of its
18 category?

19 A. Correct.

20 Q. You calculated the service fee rate
21 that Google supposedly would have charged
22 without the challenged conduct with a
23 Rochet-Triole model and a Landes-Posner model;
24 right?

25 A. Among others, but yes.

1 had just been talking about our kids and
2 wives.

3 Anyway, let's -- let's keep
4 talking about dating apps.

5 MS. GIULIANELLI: Move to strike.
6 BY MR. RAPHAEL:

7 Q. Now, you have a pass-through rate for
8 Tinder that is substantial, in the order of
9 65 percent?

10 A. I don't have it memorized, but it is
11 what it is. It's whatever their -- their
12 share is of the category that Tinder has
13 selected to market itself, in which has a lot
14 of economic meaning.

15 Q. So in your view, would it be wrong to
16 assume that the pass-through rate for Tinder
17 is zero percent?

18 A. Yeah, that -- when you say, "wrong,"
19 it would -- it would violate the predictions
20 of the Logit model. I don't think that that's
21 what Tinder's pass-through rate would be in
22 the but-for world, it would not be zero.

23 Q. So if the Match plaintiffs' expert
24 had opined that Tinder would pocket all of a
25 reduced service fee in the but-for world, it

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1 would be your opinion that that would be
2 inconsistent with economics?

3 MS. GIULIANELLI: Objection to the
4 form.

5 THE WITNESS: Yes, totally wrong.
6 BY MR. RAPHAEL:

7 Q. Your pass-through model is based on
8 categories of apps in the Google Play Store?

9 A. Correct, with one important caveat.
10 It's not just that Google gets to select the
11 categories or has selected the categories, but
12 conditional on selecting the categories, the
13 developer then selects which category they
14 want -- they want in on and they want to
15 market themselves on.

16 So I feel like you have two very
17 important pieces of economic information
18 there.

19 Q. Okay.

20 So Google decides which categories
21 exist in the Play Store; right?

22 A. Correct.

23 Q. And developers then choose which
24 category they want their app to be in; right?

25 A. Correct.

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1 going to be able to name them, but I -- I -- I
2 seem to recall a Nobel Prize maybe 15 years
3 ago for -- for applied -- an applied
4 microeconomist who was using Logit and
5 other -- other types of regressions for the --
6 the dependent variable could only take on the
7 value -- well, for certain restrictions on --
8 on the nature of the -- of the model.

9 Q. Now, you cite in your report a
10 textbook by Kenneth Train.

11 A. Yes.

12 Q. Kenneth Train is an economist at the
13 University of California, Berkeley?

14 A. That sounds right. I believe he --
15 he may have moved around, but -- but -- but
16 I -- I can take your word for it.

17 Q. Is that a standard textbook on Logit
18 or discrete choice models?

19 A. Yes.

20 Q. Can you think of a more authoritative
21 source on Logit or discrete choice models than
22 the Kenneth Train textbook?

23 A. Well, I think that any econometric
24 textbook is going to cover Logit; it's fairly
25 basic. So I think that any -- any well

1 received or widely used econometric text that
2 covers Logit could be just as -- as valuable
3 as -- as the Train text.

4 Q. Are there many situations in which
5 the Logit model is not appropriate?

6 A. I don't know if I would say, "many,"
7 because we -- we see it being applied
8 routinely by economists in the antitrust
9 space, but there are certain assumptions
10 that -- that -- that are implicit lurking
11 behind Logit, just as there are assumptions
12 lurking behind every economic model.

13 Q. And one of the -- oh --

14 A. Can I just finish? I'm sorry.

15 Q. Sorry. Sorry.

16 A. -- that you would like ideally to be
17 satisfied. In certain cases, it's difficult
18 to employ the tests for whether those
19 assumptions are satisfied as -- as is the case
20 here. But -- but I -- I'll grant you that
21 there are certain restrictions about
22 preferences in the Logit, but -- but there are
23 restrictions in every -- in every economic
24 model.

25 Q. And one of the restrictions on the

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1 Logit model is known as the independence of a
2 relevant alternative's property?

3 A. Yes.

4 Q. And the independence of a relevant
5 alternative's property says that all products
6 being studied in the Logit model should be
7 substitutes in proportion to their share?

8 A. I think that's fair.

9 Q. Okay.

10 Now, if the indepen -- indepen --
11 if the -- well, let's back up.

12 Can we call it the independence of
13 a relevant alternative's property IIA?

14 A. Sure.

15 Q. Okay.

16 And if the IIA assumption is not
17 satisfied in the Logit model, then the Logit
18 model can lead to unrealistic forecasts; is
19 that right?

20 A. I'm not going to say so necessarily.
21 I think that it could produce estimates that
22 are different than the true parameters that
23 you're hoping to estimate, but I think the
24 word that you used was unreliable? And I
25 felt --

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1 Q. Well --

2 A. -- I felt like that was too harsh.

3 Q. Well, let me just ask you this:

4 Does your Logit model satisfy the
5 IIA property?

6 A. I believe it does, yes.

7 Q. And if your Logit model does not
8 satisfy IIA, would that lead you to have any
9 concern that its forecasts are unrealistic?

10 A. Well, it would depend on -- on how
11 badly these assumptions were violated. So I
12 think that they're not. I think that the --
13 the groupings here were economically
14 reasonable. These are not my groupings; these
15 are Google's groupings that are then
16 self-selected by the -- by the apps.

17 And there are tests for IIA, I
18 think Haus -- Hausman and maybe McFadden have
19 developed a test. It's -- it has its flaws as
20 well. Those tests are not feasible here
21 because we don't have consumer level data.
22 We're -- we're just seeing the apps shares.
23 So we'd have to drop the entire app out of the
24 dataset, in which case you'd get the same
25 findings, and so you'd always affirm the IIA.

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1 Your experts, of course, didn't
2 show that IIA wasn't satisfied through those
3 tests either, which I think is confirmation
4 that we can't do those tests. But I feel
5 confident the IIA is reasonably satisfied
6 here.

7 MS. GIULIANELLI: We can -- you
8 can continue on, but at some point, let's take
9 a break. We're -- I don't want to interrupt
10 your --

11 MR. RAPHAEL: I'm happy to take a
12 break now.

13 THE WITNESS: Great.

14 THE VIDEOGRAPHER: Going off
15 record, the time is 10:37.

16 (Whereupon, a recess was taken at
17 the above time.)

18 THE VIDEOGRAPHER: Going back on
19 the record. The time is 10:47.

20 BY MR. RAPHAEL:

21 Q. Dr. Singer, is it your opinion that
22 Google established the categories in the Play
23 Store with the IIA property in mind?

24 A. That is doubtful. I think the record
25 evidence tells us that Google established the

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1 categories based largely on how Apple chose
2 its categories.

3 Now, it's possible that just as a
4 -- a pool player doesn't have physics in the
5 back of their mind, that they're -- they're
6 respecting the laws of physics. I think
7 that's a famous Bill Friedman quote, that when
8 Google is assembling its categories, it's
9 doing it in a way that satisfies the IIA.

10 But it certainly would be
11 astounding if -- if they had, if some
12 marketing person had the IIA at the top of the
13 mind when they were selecting the categories.

14 Q. Right.

15 Because to your knowledge,
16 Google's decision with -- to establish the
17 categories in the Google Play Store was made
18 as a matter of marketing?

19 MS. GIULIANELLI: Objection to
20 form.

21 THE WITNESS: I think -- I think
22 that as I just stated, the record evidence
23 suggests that Google was -- [REDACTED]
24 [REDACTED], and
25 I think that ultimately Google wants to

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1 maximize the profits of the -- of the Play
2 Store, and so it wants consumers to be able to
3 find things easily and sensibly and it's --
4 it's profit drivenal; how about that?

5 BY MR. RAPHAEL:

6 Q. And in trying to maximize the
7 profitability of the Play Store, Google
8 established the categories by reference to the
9 categories in the Apple App Store; is that
10 right?

11 A. In part, yes. That Google -- that
12 Apple made presumably intelligent choices,
13 Apple's App Store was doing well and -- and
14 Google figured that [REDACTED]

15 [REDACTED]
16 [REDACTED]
17 [REDACTED]
18 [REDACTED].

19 Q. Okay.

20 If the IIA assumption is not
21 satisfied, then the Logit model can lead to
22 unrealistic forecasts.

23 Do you agree with that?

24 A. No, I think -- I think you asked me
25 that earlier, and I think that it depends on

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1 the degree to which it's not satisfied, right?

2 In any econometric model, just
3 even ordinary lease squares, we -- we -- we
4 make all sorts of demands on the nature of the
5 error terms in the model, just as we do here.
6 And there are -- there are errors, there are
7 violations and there are other violations.
8 And so I wouldn't -- I wouldn't condemn it
9 based on -- on some small violation.

10 I think -- I think that if the
11 categories were haphazardly assigned or done
12 without any kind of economic logic such that
13 consumers did not perceive, or at least some
14 consumers did not perceive the elements to be
15 substitutes, that -- that you could get
16 unreliable forecasts.

17 Q. Okay.

18 So if consumers do not believe
19 that the products being studied in the Logit
20 model are substitutes, you can get unreliable
21 forecasts?

22 MS. GIULIANELLI: Objection to the
23 form.

24 THE WITNESS: I think that the
25 better -- the better requirement, or the more

1 formal requirement, is that if -- if this
2 property of substitution that is at the heart
3 of Logit, which is this proportional
4 substitution, that people tend to go places
5 with higher shares, then you could get a less
6 accurate forecast than -- than -- than you
7 would hope.

8 I think that unreliable is -- is
9 fairly strong language, so I'm reluctant to go
10 that far.

11 MR. RAPHAEL: Okay.

12 BY MR. RAPHAEL:

13 Q. And what is the standard for when IIA
14 has been violated to such a degree that you
15 think that the -- using the Logit model would
16 lead to forecasts that are inaccurate?

17 A. So here's some things I -- I would
18 want to look for, is did the categories make
19 economic sense, all right? Is there -- is
20 there good economic basis to believe that both
21 the developers and the consumers perceived
22 those cat -- categories to define the contours
23 of competition? And I think we have that
24 here.

25 But the second thing that I'd want

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1 to look at is how well the model fits. So the
2 proof is in the pudding. If we get the wrong
3 sign, for example, on the price term, or if we
4 get an insignificant coefficient or if the
5 R-squared of the model were low, those would
6 all be indications that the IIA was violated
7 and the Logit was not, at least applied in
8 that contingency, was not a good fit.

9 But all of those -- all of those
10 things are pointing in the right direction.
11 And that's why I have confidence, so much
12 confidence in the Logit applied here.

13 Q. All right.

14 MR. RAPHAEL: I'm going to mark
15 this as an exhibit, which is Defendants', I
16 think, 1114.

17 (Whereupon, a document was marked,
18 for identification purposes, as Exhibit
19 DX-1114.)

20 BY MR. RAPHAEL:

21 Q. All right.

22 So Defendants' Exhibit 1114 is the
23 Logit chapter from the Kenneth Train textbook
24 that you've cited in your report.

25 A. Okay.

1 Q. And I'd like you to go to page 48 of
2 the document. And you'll see at the top of
3 page 48 of the Train textbook, Professor Train
4 writes that, "Proportionate substitution can
5 be realistic for some situations, in which
6 case the logit model is appropriate. In many
7 settings, however, other patterns of
8 substitution can be expected, and imposing
9 proportionate substitution through the logit
10 model can lead to unrealistic forecasts."

11 Do you see that?

12 A. I do see that. I don't know if we're
13 talking about the Logit pass-through model
14 here. I think this is just the Logit model in
15 econometrics generally, and so I'm not clear
16 what -- which forecast Train is speaking to.
17 I don't think that he's speaking to the
18 forecast of pass-through that I'm using.

19 Q. Well, Dr. Singer, you relied on this
20 article in support of the Logit pass-through
21 model that you used in your report, didn't
22 you?

23 A. That's correct, but I'm just pointing
24 out that Train's -- Train's usage of the word
25 "forecast" most likely is speaking to a

1 different forecast than the forecast that I'm
2 using the Logit model for -- hold on -- for
3 pass-through.

4 Q. Okay.

5 Is it your testimony that your
6 Logit pass-through model does not have to be
7 consistent with general properties of Logit
8 models?

9 A. I think that the IIA does have to be
10 respected, but I think that it's a very
11 particular application of Logit and a very
12 particular prediction of what a firm's
13 pass-through rate would be, and that's the
14 forecast on which I'm relying.

15 Q. Do you disagree with what Professor
16 Train wrote on page 48 of the article that you
17 cited in support of your Logit model?

18 A. There's nothing in here that I would
19 necessarily disagree with, but when he uses
20 the word "forecast," what I'd like to do is --
21 is study the chapter more generally to see
22 which particular forecast he has in mind and
23 whether that has anything to do with the
24 forecast that I am making.

25 For example, if -- if what he's

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1 trying to predict are, say, the -- the
2 predicted shares within a category and he
3 thinks that those forecasts could be off,
4 that's not the forecast that I'm making. So
5 it's just the word "forecast" is so general
6 that it's hard for me to -- to say that it has
7 much relevance here.

8 Q. Do you agree that the Logit model can
9 produce seriously misleading forecasts if IIA
10 fails?

11 A. Seriously misleading forecasts?

12 Q. Um-hmm.

13 A. Well, so here we're trying to predict
14 pass-through rates, and I don't think that our
15 pass-through rate forecast is going to be
16 seriously misleading for some minor infraction
17 of the IIA. And in particular, you know,
18 what's happening is that on a technical
19 matter, we're -- we're concerned about some
20 unobserved attribute being correlated with the
21 error terms. But if the groupings are done in
22 an intelligent fashion, all these error terms
23 are going to cancel. They're going to wash
24 out.

25 And so I feel like -- I feel like

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1 goodness of fit of the Logit model, and -- and
2 one of the ancillary or corollary assumptions
3 that are embedded therein is the IIA. I feel
4 like if, for a given category, we had gotten
5 the wrong sign or an insignificant coefficient
6 or a low R-squared, or we had designed the
7 categories ourselves, divorced from economic
8 reality, which we didn't, that any of those
9 outcomes would have caused me to be less
10 confident in the applicability of the Logit
11 model. But every one of those indicators were
12 pointing towards yes.

13 Q. My question, Dr. Singer, was when you
14 conducted your regression, were you intending
15 to test whether the IIA assumption was met?

16 A. I think I -- I don't know if my
17 answer is any different. The intention was to
18 test whether the Logit model did a good job
19 explaining the data, but implicit in that is
20 that the IIA assumption is satisfied.

21 Q. When you conducted your regression,
22 was it your intent to test the IIA's
23 assumption in particular?

24 A. I think that indirectly, indirectly,
25 because IIA is at the heart of Logit, when I'm

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1 testing for the goodness of fit for Logit, I'm
2 implicitly testing for whether the IIA is
3 satisfied.

4 Q. So you were like the pool player with
5 physics; is that right?

6 A. I don't know if I was like the pool
7 player.

8 Q. You weren't intending to test Logit,
9 but the test that you conducted you now say is
10 a test of Logit -- of the IIA assumption?

11 MS. GIULIANELLI: Just objection
12 to the form.

13 MR. RAPHAEL: Let me -- I'll
14 strike that and ask a different question.
15 BY MR. RAPHAEL:

16 Q. When you conducted your regression
17 with respect to the Logit model, did you have
18 the IIA assumption in mind?

19 A. Yes.

20 Q. Okay.

21 And was it your intent, in
22 conducting that regression, to test whether
23 the IIA assumption was met?

24 A. I think indirectly, that was in the
25 back -- that was an intent. My -- my -- the

1 intent that was at the front of my mind was
2 will the Logit model do a good job or a bad
3 job at explaining substitution patterns within
4 a given category, right? And implicit in that
5 objective is whether the IIA was satisfied.

6 Q. Did you cite any published economics
7 article in your reports to establish that it's
8 appropriate to test the IIA assumption using
9 the kind of regression that you did?

10 A. I don't think I've cited articles in
11 my report that my test was a test of IIA. I
12 think that I feel confident that IIA was
13 satisfied by virtue of the fact that Google
14 selected the categories, the developers
15 selected in, the model fit well and then
16 finally, I tested the model under other demand
17 specifications.

18 There was quite literally nothing
19 else that I could do and there was nothing
20 that your expert did in rebutting it, zero.

21 Q. Right.

22 A. Nothing. Dr. Leonard did no test of
23 the IIA.

24 Q. Right.

25 Other than the regression that you

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1 did, there was no way for you to test whether
2 the IIA assumption was met; is that right?

3 A. No, that's not right. You're not --
4 you're not hearing what I'm saying.

5 I have confidence that the IIA was
6 satisfied because these are economically
7 sensible categories that were designed by
8 Google, that were selected into by the
9 developers. And then when we go to do the
10 actual fit, had the results come back
11 differently, had the coefficients been the
12 wrong sign, had they not been significantly
13 significant, had the R-squareds been low, and
14 then had another demand model done a better
15 job at explaining the variation of the
16 substitution patterns in the data, I would
17 have abandoned Logit.

18 Q. Okay.

19 Other than your regression, was
20 there any test you are aware of that you could
21 have applied to determine whether the IIA
22 assumption was met?

23 A. Yes, and I now feel like I'm
24 repeating myself. There is the
25 Hausman-McFadden test.

1 Q. But you couldn't apply that here,
2 could you?

3 A. Let me finish. Let me just finish.

4 Yeah, the Hausman-McFadden test
5 requires you to drop all consumers from the
6 data who selected a particular choice and then
7 re-estimate the model and -- and compare the
8 coefficients, right?

9 Yes, you cannot do that here
10 because we don't have that kind of granularity
11 in the data.

12 Q. Are you aware of any source in
13 economics that indicates that it is an
14 appropriate and reliable way to test for the
15 IIA assumption to do the kind of regression
16 that you did here?

17 A. I don't think that that's how you'd
18 find it in a textbook. I think that the way
19 that an econometrician would counsel you is
20 you have an assumption about how consumers
21 choose within a category; right? If the model
22 doesn't fit well, then that would tend to
23 indicate that assumption is violated. But it
24 starts with the -- with the goodness of fit of
25 the model itself.

1 Q. Okay.

2 Are you aware of any source in
3 economics that indicates that it's a reliable
4 way to test for the IIA assumption to do the
5 kind of regression that you did?

6 A. Let me hear it back. I'm sorry.

7 Q. Are you aware of any source in
8 economics that indicates that doing the
9 regression that you did is an appropriate and
10 reliable way to test for whether the IIA
11 assumption is met?

12 A. I don't know if -- if I can point
13 you, sitting here, to an economic source for
14 that proposition, but what -- what economics
15 counsels is that to determine whether a model
16 is appropriate, you need good economic
17 foundation and you need a goodness of fit in
18 the data.

19 And then finally, what I did is I
20 tried alternative specifications. I don't
21 think there's anything else that we can do.

22 Q. Okay.

23 Are you aware of any source in
24 economics that goodness of fit is an
25 appropriate way to test for the IIA

1 assumption?

2 A. No. The way that the economics will
3 tell you is that goodness of fit will tell you
4 if the Logit is a -- is a -- is the relevant
5 way to describe preferences in substitution
6 patterns here.

7 Now, IIA is lurking in the
8 background of all of that.

9 Q. Right.

10 But you're not aware of any source
11 in economics that goodness of fit is an
12 appropriate way to test for the IIA assumption
13 directly?

14 MS. GIULIANELLI: Objection to the
15 form.

16 THE WITNESS: I think that if you
17 go into the economic literature and you see
18 the vast application of Logit in antitrust,
19 mergers in particular, I think that for an
20 economist or an agency, or an agency's
21 economist to feel good about using Logit, what
22 they care most about is whether the categories
23 were constructed intelligently and with a good
24 grounding in economics and in -- in record
25 evidence.

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1 doesn't do a good job here.

2 BY MR. RAPHAEL:

3 Q. Did you consider in your reports or
4 are relying on any model of log linear demand?

5 MS. GIULIANELLI: And I'm going to
6 object to -- to the question there to the
7 extent that it calls for something not relied
8 upon.

9 THE WITNESS: It is -- it is
10 certainly possible, and I don't know this for
11 certain, but it is certainly possible that
12 when my modelers are trying out different
13 demand specifications, that they would have
14 tried out a log linear. But I -- sitting
15 here, I don't know that for a fact.

16 BY MR. RAPHAEL:

17 Q. Do you have any view on whether log
18 linear would be an appropriate model of demand
19 for the apps and app transactions at issue in
20 this case?

21 A. I don't have a view, but at the end
22 of the day, I'm agnostic as to what's the best
23 fit, you know. If -- if -- if -- if a -- if
24 there's another model out there that does a
25 better job at -- at explaining the data, then

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1 I -- I should consider it.

2 Q. A log linear demand model is not
3 subject to the IIA property; right?

4 A. It is not subject to IIA, but it
5 imposes other restrictions on the error terms,
6 right?

7 So there is no model that is, you
8 know, restriction-free. Every model that
9 you -- that you employ has certain lurking
10 assumptions about the error terms, every
11 model, right?

12 And -- and so I'll leave it at
13 that.

14 Q. You agree that developers set their
15 prices ending in 99 cents the vast majority of
16 the time?

17 MS. GIULIANELLI: Objection to the
18 form.

19 THE WITNESS: I don't know if it's
20 the vast majority. I know that they often do,
21 but we've seen every price point in the data;
22 I've got a figure that shows every price
23 point.

24 And we should also know that 99
25 was a restriction that was imposed by Google

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1 would -- that would somehow not move, and it's
2 something below a half a percent. It's de
3 minimus.

4 Q. Right. So let's -- let's look at
5 that. That's page 203 of your opening Merits
6 report.

7 A. Okay.

8 Q. And this is Table 17.

9 A. Yes.

10 Q. So you find there that some non-zero
11 amount of developers would not reduce their
12 prices if they were committed to having their
13 prices end in 9; isn't that right?

14 A. Correct.

15 Q. Do you know how many developers
16 that -- that amounts to?

17 A. Sitting here, I don't, but it's --
18 should be easy to figure out the backup.

19 Q. Did you run a version of this table
20 in your reports with the assumption that
21 developers would want to set prices ending in
22 99?

23 A. I did not.

24 Q. Okay.

25 And do you know the percentage of

1 What the Miller article that is
2 published peer reviewed that I'm using is
3 looking at a different experiment, which is
4 what happens when there's a systematic
5 increase in the cost of all competitors within
6 a market. Very different experiment.

7 Q. Okay.

8 And the Miller article you cited,
9 does that refer to a per unit cost -- sorry,
10 I'll ask a different question.

11 The Miller article that you cited
12 for your Logit model, does that refer to an ad
13 valorem cost in any way?

14 A. It refers to a perturbation in the
15 marginal cost. And the way that Miller
16 motivates the perturbation, which is a
17 frustrating word, is -- is through a per unit
18 tax.

19 Economists, when employing the
20 Logit model, often try to exploit taxes as an
21 instrument that moves a firm's costs around so
22 as to infer what the pass-through rate would
23 be.

24 Q. Right.

25 But my question was does -- the

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1 Miller article does not refer to a ad valorem
2 cost in any way?

3 A. I don't think that it explicitly
4 refers, but it talks about perturbations in
5 marginal costs and the ad valorem tax that
6 Google imposes perturbs the firm's marginal
7 costs.

8 Q. Well, changes in ad valorem costs and
9 per unit costs perturb marginal costs in
10 different ways; right?

11 A. Oh, they could, but what the
12 derivative is going to tell you is how the
13 optimal price change is given an
14 infinitesimally small change in the firm's
15 marginal cost. And the ad valorem tax is
16 going to do that, is going to -- is going to
17 change the marginal cost, as will a per unit
18 tax.

19 Q. But you would use different math to
20 find how a change in an ad valorem cost
21 changes the marginal cost compared to a per
22 unit change in cost; right?

23 A. No, we can -- I don't know what you
24 mean by different costs, but we can solve to
25 the last decimal place the degree to which

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1 Q. Is it your opinion that your sales
2 tax regressions show that developers have
3 actually changed their pre-tax prices in
4 response to changes in sales tax rates?

5 A. I think so, yes.

6 Q. Okay.

7 And your regression is
8 specifically measuring whether that happened?

9 A. Yeah. In particular, the second
10 specification, you know, the one I'm
11 remembering a parameter of .7, is telling us
12 that we see -- we see developers stepping up
13 and taking a bit of the burden of the tax,
14 this is called tax incidence in
15 microeconomics, applied microeconomics, and as
16 expected, the pain is going to be shared in
17 some way between the consumer and the
18 producer.

19 And this analysis, very
20 traditional analysis of tax incidence, is
21 telling us that the developers were willing,
22 on average, to -- to bear a portion of the
23 load.

24 Q. Well, you say, "on average."

25 Is it -- does your analysis find

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1 that all developers reduce prices when sales
2 tax rates changed?

3 A. I don't know if it can go as far as
4 all, and that's a strong word. I think that
5 we're looking at our central tendencies in the
6 database.

7 Q. Okay.

8 So it's not your opinion that your
9 sales tax regression shows that all developers
10 reduce their prices when their sales rate tax
11 changed?

12 A. I think that would be too strong of a
13 statement. I think that their -- the data --
14 that the results could be consistent with the
15 majority, the vast majority doing so, but a
16 few not. I don't think that it can speak to
17 all, I don't think in any regression.

18 Q. Well, do you know what percentage of
19 developers changed their prices when their
20 sales tax rate changed?

21 A. Sitting here, I can't tell you. I
22 think that that's something that is solvable,
23 but sitting here, I can't tell you what their
24 --

25 Q. Did you estimate that in your

1 reports?

2 A. I don't think so.

3 Q. Okay.

4 And price stickiness didn't stop
5 developers from changing their price when
6 their sales tax rate changed; right?

7 A. Correct. It may have impeded it to
8 some extent, but it -- it didn't fully stop it
9 because of the coefficients that we find.

10 Q. And in your tax regression, the
11 independent variable is the tax rate; right,
12 the percentage?

13 A. I think that's right, but it's
14 possible that we multiplied it by the -- the
15 value of the -- of the app, itself. I just
16 would have to go back in the code. But that's
17 what's driving variation for sure on the
18 right-hand side of the regression.

19 Q. You don't know whether your
20 independent variable for the tax regression is
21 the percentage of the sales tax or the gross
22 amount?

23 A. Sitting here, I just -- that's
24 something I can't recall, but -- but I will
25 fully acknowledge that that's what's driving

1 you tried to do the derivative in your head.

2 I think that when you look at the
3 traditional models of pass-through, which,
4 remember, are a derivative of the -- if you
5 think of it as a derivative of the Lerner
6 index, it's -- it's looking at how the profit
7 maximizing price changes in response to a
8 change in cost.

9 And then you look at the most
10 common functional forms. You'll often see
11 that marginal cost drops out of the
12 pass-through equation.

13 BY MR. RAPHAEL:

14 Q. Well, does it drop out when you're
15 looking at an ad valorem cost?

16 A. In this case, it drops out of the
17 pass-through equation, yes.

18 Q. Okay.

19 And can the amount of a
20 developer's marginal cost, other than the
21 service fee, affect the amount of
22 pass-through?

23 A. Not under the Logit model that I'm
24 using. It's conceivable it could in others,
25 but in my Logit model -- not -- in the Logit

1 model, it's not mine, in the Logit model, it
2 tells you what portion of every dollar in
3 marginal cost reduction is going to be passed
4 through to the user.

5 And when you think about how to
6 calculate that reduction in marginal cost, it
7 doesn't turn on the other marginal costs; it
8 turns instead on the developer's price and the
9 change in the take rate.

10 Q. Right.

11 So your Logit model that you used,
12 the estimate of pass-through damages is not
13 affected by any developer's marginal costs
14 other than the service fee?

15 MS. GIULIANELLI: Object to the
16 form.

17 THE WITNESS: I think that
18 mechanically, you don't need to know the other
19 marginal costs in order to implement the Logit
20 model, but this is an important caveat. I
21 just want to make sure that you know that that
22 Logit model, and any other derivative of
23 the -- of -- let's call it the first order
24 condition or the profit maximizing price, all
25 takes into account the cost; that is, the

1 costs are in the formula when you take the
2 first derivative, right?

3 You start with a profit function,
4 you take the derivative, and you get the
5 profit maximizing price. Then you take
6 another derivative of that profit maximizing
7 price with respect to a change in cost. It
8 just so happens that under the most common
9 functional demand forms, the marginal cost
10 falls out of the math.

11 So I just want to make sure the
12 record is clear. To go implement Logit, to go
13 implement Linear, you don't need to know the
14 firm's other marginal costs, but that's not to
15 say that they play no role in the pass-through
16 calculus.

17 BY MR. RAPHAEL:

18 Q. Have you estimated in your reports
19 any developers' marginal costs other than the
20 service fee?

21 A. No, and I feel like you asked me this
22 before. I'm confident that they have other
23 marginal costs, but I haven't estimated at the
24 developer level what their other marginal
25 costs are.

1 The most -- I mean, the most
2 obvious one would be processing fees. But
3 there are other marginal costs, royalty fees
4 that they pay, but -- but I haven't estimated
5 those at the developer level.

6 Q. One of the inputs into your
7 pass-through model is Google's market share in
8 a world without the challenged conduct.

9 A. Not in the pass-through model. Did
10 you mean to say -- it certainly -- Google's
11 market share is in Rochet-Triole and it's in
12 Landes-Posner.

13 Q. Yes. One of your inputs into
14 calculating what Google's but-for service fee
15 would be is Google's market share in the
16 but-for world.

17 A. Correct.

18 Q. And you estimated that share to be 60
19 percent; right?

20 A. I -- I used as an input the
21 60 percent because that's the best that the
22 economic literature in busting up monopolies
23 can -- can give to us.

24 I also, you know, would note --
25 yes, that is -- that is the best estimate that

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1 I could find in the literature.

2 Q. Okay.

3 And that market share estimate is
4 based on an article that attempted to estimate
5 AT&T's market share in the longest in its
6 telephone market in the 1980s?

7 A. Yes, with one important caveat that
8 you left out, which was after AT&T's
9 anti-competitive tie was unwound, right?

10 What I -- what I was looking for
11 was the closest analogue in antitrust history
12 in which a dominant firm that had extended its
13 leverage from one market into another was
14 forced to unbundle or break apart the tie.
15 There aren't a lot of such episodes, right, in
16 the history of antitrust for reasons that we
17 could describe -- discuss over coffee, but we,
18 in any event, it's a network industry; it's
19 the monopoly, where the tie gets removed.
20 It's been studied ad nauseam by economists
21 for -- for the price effects that can be
22 attributable. And so I thought that
23 60 percent was the best estimate.

24 And in any event, it turns out
25 my -- my in-app model for damages is not that

1 sensitive to the 60; that is, as you put in
2 different inputs for 60, you go to 70 or if
3 you think that Google share would have fallen
4 to 50, it just turns out that the model is not
5 that sensitive to that input.

6 Q. Well, do you disagree that if
7 Google's but-for market share is 75 percent,
8 that your damages figure falls by over
9 40 percent?

10 A. No, it wouldn't. It would not.

11 So you're saying if all you did --
12 see, what -- what Dr. Leonard, respectfully,
13 did was that he kept changing two parameters
14 at a time. He kept changing the but-for share
15 and the actual share. If he held everything
16 constant for Landes-Posner, if you change just
17 the but-for share, say, by 10 percentage
18 points, you get, depending on which direction
19 you go, you get something on the order of a 5
20 percentage point swing in damages.

21 And so what -- what that's telling
22 you is that the input is important, but the
23 results don't vary significantly, or let's
24 just say the results aren't amplified based on
25 the change in this input; that they're, in

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1 being sued for -- for similar allegations of
2 the challenged conduct that's here.

3 Q. Are you offering an opinion in this
4 case that Apple is engaged in any
5 anti-competitive conduct?

6 A. I -- I have not offered that opinion,
7 but I can rule out putting Apple in the
8 benchmark when it is the subject of -- of
9 antitrust scrutiny for having engaged in many
10 similar strategies here and charging, you
11 know, what I believe to be a super-competitive
12 take rate in perpetuity on ancillary
13 transactions.

14 Q. Let's talk about your Play Points
15 model for a minute.

16 A. Okay.

17 Q. Just so we're clear, users have to
18 opt in to Play Points?

19 A. Yes.

20 Q. And in the actual world, less than
21 [REDACTED] of Play Store users actually opted
22 in to Play Points; right?

23 A. Right. Google is so skimpy with its
24 subsidy today that it blunts the incentives of
25 consumers to -- to opt in. There are costs to

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1 opting in and participating in a loyalty
2 program, and if the benefits for doing so are
3 paltry, that could affect how many people take
4 advantage of the program.

5 Q. Right.

6 There are costs to opting into a
7 rewards program; right?

8 A. Yes.

9 Q. Okay.

10 And in the -- in your Play Points
11 damages model, you assume that all Play Store
12 users would have signed up for the Play Points
13 program?

14 A. No.

15 Q. You don't?

16 A. No, not necessarily. What I'm trying
17 to solve for is the extent of a subsidy that
18 Google would have offered across -- in the
19 aggregate across all users, but I don't think
20 that I'm necessarily assuming that each user
21 avails itself. It's possible that it would,
22 but my -- my damages model for aggregate
23 damages is looking at the savings to the class
24 if Google were to be more generous in its
25 subsidy program.

ATTORNEYS' EYES ONLY

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1 Q. Your Play Points model measures the
2 damages that consumers would have incurred in
3 the aggregate?

4 MS. GIULIANELLI: Objection to the
5 form.

6 THE WITNESS: I think that my
7 model is being offered for an estimate of
8 aggregate damages, among other things; I think
9 it also speaks to injury and impact. But I --
10 I -- I believe that that -- that -- that
11 parameter that comes out that we're interested
12 in, which is the price on the consumer side of
13 the market, is telling you across all
14 consumers, this is -- this is what -- what --
15 what Google will pay.

16 BY MR. RAPHAEL:

17 Q. Does your Play Points model tell the
18 jury how much a user who did not sign up for
19 Play Points in the actual world was damaged?

20 A. You could estimate, for a given
21 member of the class, you could estimate what
22 the reduction in -- in his or her net payments
23 would be relative to what they spent in the
24 actual world. And you wouldn't abandon that
25 exercise simply because they didn't use Play

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1 Points in the real world. In the real world,
2 the reason why most people or many people
3 didn't use it is because Google was so skimpy
4 with the offering.

5 In a but-for world in which Google
6 is forced through competition to employ a more
7 generous points model, including making the
8 enrollment easier, they'd -- they'd be forced
9 to. Under -- in a competitive market, it
10 would be reasonable to assume that -- that
11 most, if not all, consumers in the class
12 would -- would partake and -- and take
13 advantage of that -- of that program.

14 Q. Are you offering the opinion that all
15 users in the but-for world would have signed
16 up for the Google Play Points program?

17 A. Economists tend to be reluctant to
18 say all, like do I know with certainty or to a
19 reasonable certainty that every single class
20 member signs up? I don't know if the model
21 can tell us that.

22 What the model is telling us is
23 what's the -- what is the aggregate or average
24 subsidy that Google offers. And I think that
25 it is reasonable to infer that if the subsidy

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1 gets sufficiently large such that it is a
2 meaningful reward, that most, if not all,
3 consumers will take advantage of it in the
4 but-for world.

5 Q. Have you estimated what portion of
6 users would have signed up for the Play Points
7 program in the but-for world?

8 A. I feel like that question is no
9 different from the -- from the last.

10 I have not given an empirical
11 estimate of the proportion. I think it's very
12 high, it could be close to 100 percent, but
13 there's no requirement that it's a hundred
14 percent for the model to -- to hold.

15 Q. If I were to come to you with a user
16 chosen at random from the data that you've
17 looked at of people that used the Google Play
18 Store, could your model tell me whether that
19 user would have signed up for the Google Play
20 Points program in the but-for world?

21 A. I don't think the model tells you
22 whether a user will sign, but what the model
23 can tell you is what the subsidy, what the
24 predicted subsidy would be for that user. And
25 if the subsidy is as large as these models are

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1 implying, whether it's the Rochet-Triole model
2 or the Amazon model, these are big numbers;
3 we're talking about [REDACTED] percent savings.

4 It seems like a safe inference is
5 that if a -- if Google wants to credit you
6 between [REDACTED] and [REDACTED] percent, I'm going by
7 memory, of the -- of the price of partaking in
8 all the fun of its Play Store, that most, if
9 not all, consumers will avail themselves of
10 that option.

11 Q. Have you calculated the minimum value
12 of the Play Points subsidy that would be
13 necessary to get any consumer to sign up for
14 Play Points?

15 A. I haven't calculated it down to the
16 decimal, but my opinion is this; that in the
17 actual world, with a -- with a paltry subsidy
18 of [REDACTED], you see many people not
19 availing themselves of the option.

20 In a but-for world where the
21 subsidy is in the order of [REDACTED] percent,
22 if we -- if Google matches Amazon, I think a
23 safe inference is that all or almost all
24 consumers will avail themselves of that
25 option.

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1 Q. Well, your Play Points model, though,
2 is about the percentage of the price that
3 would be credited back to consumers, not the
4 percentage of Google's revenue; right?

5 A. Oh, no, no, no. Hold on. We're on
6 the same page, I think. It's the percentage
7 of the price from the consumer's perspective;
8 right?

9 Q. Right.

10 A. And so if -- if in a but-for world,
11 Google takes its subsidy from, say, [REDACTED]
12 [REDACTED] to [REDACTED], right, that is a
13 material change in the terms of the program,
14 at which point you're looking at all your
15 friends who are getting [REDACTED] off and you
16 say hey, sign me up, I'll take some of that,
17 too.

18 Q. Right.

19 Have you calculated the percentage
20 credit on the price that would be necessary
21 for any consumer to find it worth it to
22 overcome the cost of signing up and sign up
23 for the Play Points program?

24 A. I haven't calculated the percentage,
25 but I will say that in a but-for world where

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1 Google is going head-to-head with a -- with a
2 competitor who is competing on this dimension,
3 whether it's Amazon or Facebook or Samsung,
4 that Google would make sure that whatever
5 enrollment costs there were, they would not be
6 so prohibitive as to allow that rival to eat
7 their lunch.

8 Q. Have you done any analysis of the
9 elasticity of demand for the Play Points
10 program?

11 A. I have done elasticity of demand of
12 consumers with respect to pricing in the App
13 Store. So to the extent that Play Points or
14 any subsidy changes pricing, you could figure
15 out what the sensitivity would be.

16 Q. But you haven't tested whether what
17 happens when Google changes its Play Points
18 subsidy and how that affects whether people
19 sign up for the Play Store -- for the Play
20 Points program; you haven't done that?

21 A. Well, it's a bit of a trick question
22 here, because Google has been at -- at this
23 paltry [REDACTED], you know, since the advent
24 at least in the U.S.

25 Now, there are some experiments

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1 that you might be able to look at. In Korea
2 and Japan, I think that Google tried to meet
3 the limited competition that -- that occurred
4 there with an increase in the subsidy. But I
5 haven't studied -- I haven't studied what the
6 reaction would be.

7 I think it's safe to infer that
8 Google felt, and this is just kind of basic
9 economics, that Google felt compelled to meet
10 the competition because they feared that if
11 they didn't -- if they weren't competitive on
12 that dimension, they would lose customers.

13 Q. Your Play Points model also uses the
14 elasticity of demand from an article about
15 AT&T long distance in the 1980s?

16 A. That's of the rival elasticity,
17 that's right.

18 Q. Right.

19 And that's drawn from the same
20 article as the article where you got the
21 but-for share for Google; right?

22 A. Correct.

23 Q. And you didn't calculate the
24 elasticity of demand in the but-for world
25 yourself?

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1 A. Well, this is -- remember what we're
2 talking about is the rival supply elasticity.
3 So Google by the tie doesn't allow any rival
4 to enter and expand, and now you're asking me
5 where's your -- where's your model, Singer,
6 for how PayPal or Stripe, you know, would have
7 responded to an increase in Google's price.
8 They couldn't come in by virtue of the tie.

9 So I don't think that -- that
10 life, by virtue of Google's restrictions and
11 the challenged conduct here, is going to allow
12 us to test for rival supply elasticity
13 particularly in the but-for world.

14 Q. You didn't present your Amazon Coin
15 damages model at the class certification
16 stage?

17 A. That's correct.

18 Q. Why not?

19 A. I don't think that I had data at
20 that -- at that time to estimate Amazon's
21 subsidy.

22 Q. And your Amazon Coins damages model
23 is used for calculating aggregate damages?

24 MS. GIULIANELLI: Objection to the
25 form.

ATTORNEYS' EYES ONLY

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1 THE WITNESS: Correct. That --
2 that's fair, among other things. But I think
3 that the primary purpose here, now that we're
4 at the merits, is what the -- what aggregate
5 damages are.

6 BY MR. RAPHAEL:

7 Q. And if I -- again, if I took a user
8 at random from the -- from the data on the
9 users of the Google Play Store, could your
10 Amazon Coins model tell me whether -- how much
11 in subsidy that consumer would have received?

12 A. Yes.

13 Q. And could it tell -- and -- and is
14 your idea that the subsidies in your Amazon
15 Coins model would have been part of a program
16 that all users would have signed up for?

17 A. I think that once you get into the
18 [REDACTED] range, I think that it would be
19 irrational and illogical for a consumer to
20 pass up that savings. They would figure out a
21 way to get enrolled.

22 Q. Okay.

23 But you -- again, you haven't
24 studied, with respect to your Amazon Coins
25 model, the percentage of savings that would be

ATTORNEYS' EYES ONLY

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1 necessary to get all users of the Google Play
2 Store to sign up?

3 A. The model isn't going to tell us
4 that, but I think basic economics would
5 dictate that if the subsidy got that large,
6 all or almost all consumers would avail
7 themselves of the program.

8 Q. Have you studied whether there's any
9 consumer who just finds the idea of being
10 enrolled in a loyalty program so cumbersome
11 and annoying that there's no amount of reward
12 that they would take to actually sign up?

13 A. I don't think that that can -- can
14 happen in the but-for world because I think
15 that two things, is that the subsidy, once it
16 gets [REDACTED], I mean, that's --
17 that becomes a real savings to the consumer;
18 and number two, Google can't throw up so many
19 frictions in its but-for loyalty program that
20 it -- it tends to impede the usage of the
21 program.

22 That -- if people thought that --
23 that it was difficult to enroll and Amazon was
24 up and running or Facebook was up and running
25 with its loyalty program and it made it

ATTORNEYS' EYES ONLY

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1 easier, I think there would be a giant, you
2 know, sucking sound as people switched over.

3 Q. Okay.

4 And again, if a user did not sign
5 up for Google's subsidy program that you're
6 positing in your Amazon Coins model, would
7 that consumer have been any better off in the
8 but-for world under your Amazon Coins model?

9 A. I think so, because even if you don't
10 avail yourself of the option, so long as
11 credits are accumulating, that -- that a
12 consumer could perceive that as --

13 Q. Sorry.

14 A. -- as a savings.

15 Q. Let me clarify my question.

16 If a user did not sign up for the
17 subsidy program and therefore was not eligible
18 to earn any subsidies in your hypothetical for
19 your Amazon Coins model, would that consumer
20 be any better off in the world that you've
21 posited?

22 MS. GIULIANELLI: And just
23 objection to the form.

24 THE WITNESS: Yeah, what -- what
25 you're doing is you're -- you're assuming that

ATTORNEYS' EYES ONLY

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1 there's a sign-up process in the but-for
2 world, right. So I just use Starbucks points
3 this morning, which is where I start, and I
4 usually go -- I go to a different place in the
5 afternoon, but I start at Starbucks. And --
6 and I don't remember having to enroll in the
7 Starbucks program. I mean, it just was --
8 just when I got the app on my phone, I was
9 enrolled in the Starbucks app.

10 So you're -- you're -- you're
11 creating this assumption that Google is going
12 to create some frictions, and they might do
13 that now because they don't have competition.
14 But in a but-for world in which a rival is
15 attacking them with a [REDACTED] subsidy and
16 easy enrollment, then it would be in Google's
17 best interest to also use easy enrollment; in
18 fact, maybe even auto enrollment.

19 BY MR. RAPHAEL:

20 Q. Okay.

21 Are there loyalty programs that
22 don't use auto enroll?

23 A. I'm thinking about all the ones that
24 I'm enrolled in and I -- you know, I can't --
25 I don't even have -- it seems to me that when

ATTORNEYS' EYES ONLY

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1 you join an airline, you're auto enrolled,
2 credit cards, auto enrolled. I don't -- I
3 don't remember filling out an application to
4 enroll in almost any loyalty program.

5 Q. You ever go to a drugstore or a
6 grocery store and they ask you if you want to
7 sign up for the rewards card?

8 A. Yes. CVS asked me, that's -- that's
9 true.

10 Q. Right.

11 And so does your Play Points model
12 and Amazon Coins model assume that Google will
13 automatically enroll all users in a subsidy
14 program?

15 A. It doesn't assume auto enrollment,
16 but -- but it does, I think, presume that if
17 competition is occurring on that dimension,
18 Google is going to make the enrollment costs
19 seamless and trivial or -- or nonexistent, in
20 which case they would use auto enrollment.

21 MS. GIULIANELLI: Happy to have
22 you continue, but at some point, let's take a
23 break just because I think --

24 MR. RAPHAEL: Sure.

25 MS. GIULIANELLI: -- it's getting

1 to be lunch, close to lunch.

2 MR. RAPHAEL: Yeah. No problem.

3 I'm getting close to finishing
4 this topic, so maybe we just do that and we'll
5 be done and take a break.

6 BY MR. RAPHAEL:

7 Q. Your Play Points model assumes that
8 the Play Store would have a durable incumbency
9 advantage in the but-for world?

10 A. The Play Points model does, as do
11 many of my models, credit an incumbency
12 advantage, and -- and therefore, yeah, offers
13 what I think is a conservative estimate of
14 damages.

15 Q. Why have you not made the same
16 assumption in your Amazon Coins model?

17 A. The Amazon Coins model presumes that
18 Google fully matches Amazon's offer. And I
19 think that's reasonable for -- for several
20 reasons. One is that I think that Amazon
21 would pose a sufficient threat that Google
22 would have to take it seriously when they
23 actually -- actually consider having to go all
24 the way down.

25 And number two, I feel like the

1 types of services that we're -- that we're
2 talking about here could reasonably be
3 understood as being homogenous, in which case
4 we do get -- economics would predict prices
5 that are the same between the incumbent and
6 the rivals.

7 So just long way of answering,
8 I've got one set of models that allows for an
9 incumbency advantage, in which case Google is
10 able to command a price premium vis-a-vis its
11 attackers, and I've got the Amazon model that
12 presumes that Google would not be able to
13 command a premium.

14 And I think that -- I think that
15 they're both reasonable, but I think that
16 those are the bounds around which the possible
17 damages could be.

18 Q. Well, your Amazon Coins model
19 estimates [REDACTED] more in damages
20 than the Play Points model; right?

21 A. Well, I don't know if it's [REDACTED]
22 [REDACTED], but I -- I will grant you that it is
23 an increase in the -- in the -- in the subsidy
24 from, and I'm going by memory, maybe
25 [REDACTED] under Play Points up to [REDACTED].

ATTORNEYS' EYES ONLY

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1 So that's what's doing the work.

2 The base of transactions are no
3 different in the two models. So [REDACTED]
4 sounds like a lot, but we're actually just
5 toggling between say [REDACTED] subsidy to a
6 [REDACTED] subsidy --

7 Q. Well --

8 A. -- which I don't think is that --
9 that large of a range.

10 Q. As between the Play Points model and
11 the Amazon Coins model, which do you think is
12 a more reliable model of the but-for world?

13 A. I don't -- I don't know if I have an
14 opinion as to which one is more reliable. I
15 think they're both reliable. I think that
16 I've set the bounds now on -- on -- on what
17 damages could be. And one is certainly more
18 conservative, which is the one that -- that
19 allows Google to preserve a -- an incumbency
20 advantage.

21 So I think that it's -- I think
22 that it's fine to offer the two and -- but
23 I -- but I feel it's a bit unfair to say --
24 it's like asking me to choose between my
25 daughters. You know, these are two good

ATTORNEYS' EYES ONLY

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1 models and I think they're both reasonable.

2 Q. So you can't say whether it's more
3 reliable for the -- to estimate damages at the
4 [REDACTED] that you have for the
5 Amazon Coins model or the [REDACTED]
6 that you have for the Play Points model?

7 A. No. And you keep -- you keep going
8 back to the difference in the magnitude.
9 That's just because we have such a large base
10 of spending.

11 What we're really trying to figure
12 out is as we toggle between the [REDACTED] of
13 the Play Points and [REDACTED], which is about
14 [REDACTED], should we -- should we
15 credit Google with an incumbency advantage or
16 should we not.

17 I think there are legitimate
18 arguments that would suggest that if entry by
19 a rival were to occur early enough in the
20 place for experience, then it would be -- it
21 would be too charitable to Google to credit it
22 with an incumbency advantage, right? If
23 Google were facing a rival right out of the
24 gate, right, what's the source of its -- of
25 its incumbency advantage?

ATTORNEYS' EYES ONLY

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1 Q. Have you formed an opinion as to
2 which of the numerous different damages models
3 that you have is the most reliable one for the
4 jury in this case?

5 A. I think it's -- it's hard to compare
6 models that are meant to do different things,
7 right? We've got some models that are meant
8 to -- to come up with but-for take rates and
9 pass-through in the -- in the primary market.
10 We've got a different model that's meant to
11 predict the but-for take rate in the
12 aftermarket.

13 I don't know how one would say
14 that one is better than the other. I feel
15 like these are the best that economics has to
16 offer for each of the -- each of the problems
17 that I've been given.

18 Q. Did you consider using any other App
19 Store as a benchmark for your subsidy model
20 rather than the Amazon App Store?

21 A. It's -- it's certainly possible I
22 considered. One -- one problem that I had,
23 for example, with the ONE Store is that the
24 ONE Store is competing along both dimensions.
25 I think they took their take rate down and

ATTORNEYS' EYES ONLY

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1 they did a more generous subsidy program. And
2 remember, in this -- when we go down this
3 branch of the tree, we're thinking about
4 competition that only occurs on one dimension;
5 namely, take rate.

6 And the second thing that -- that
7 worried me about ONE Store is that it's --
8 it's specific to Korea and Amazon was -- was
9 global. And so I felt that -- that we just
10 didn't have as good of a benchmark as Amazon
11 for -- for that parameter.

12 Q. Okay.

13 A. Oh, there's one more reason, too, is
14 that I don't think we have the magnitude of
15 ONE Store's subsidy. We have the dollar
16 amount, I found press articles that said it's
17 X hundreds of millions of dollars, but I --
18 I -- I wasn't able to -- to generate a -- a
19 subsidy in terms of percent of spend for ONE
20 Store.

21 Q. Okay.

22 MS. GIULIANELLI: Pretty soon we
23 can take a break for lunch.

24 MR. RAPHAEL: Sure.

25 BY MR. RAPHAEL:

ATTORNEYS' EYES ONLY

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1 Q. Did you -- did you analyze whether
2 any of the benchmark App Stores in Table 7
3 offer subsidies and whether you could use
4 those as benchmarks?

5 A. I did not.

6 Q. Okay.

7 Just a couple more questions and
8 we can take a break for lunch.

9 A. Okay.

10 Q. Now, users sign up for Play Points
11 and then they earn points when they make
12 purchases; right?

13 A. Correct.

14 Q. And Amazon Coins have to be purchased
15 separately?

16 A. Correct.

17 Q. Did you consider whether that
18 difference could affect whether the Amazon
19 Coins program is a proper benchmark?

20 A. I certainly considered it, and I just
21 want to make clear that in my -- in my but-for
22 world under this model, I am not positing that
23 Google mimics Amazon's program verbatim,
24 right. I recognize there are differences in
25 the program.

1 What -- what I'm interested in in
2 looking at the Amazon experiment is the size
3 of the subsidy. These are -- these are monies
4 that were actually redeemed by Amazon's
5 consumers and that's the -- that's the input
6 that my model is calling for.

7 Q. Did you consider whether any
8 differences between the Amazon Coins program
9 and the Play Points program could affect how
10 much Amazon offered as a subsidy?

11 A. I mean, I studied the differences in
12 the program, but I can't -- I can't think of a
13 good reason sitting here, maybe you can give
14 me one, for why that difference in the program
15 would cause the subsidy to vary. I just -- I
16 can't think of one.

17 Q. Well, when users buy Amazon Coins
18 separately and they can't be converted back to
19 cash; right?

20 MS. GIULIANELLI: I'm sorry, did
21 you say can or can't? I just...

22 BY MR. RAPHAEL:

23 Q. When users buy Amazon Coins
24 separately, they can't convert those Amazon
25 Coins back to cash; right?

ATTORNEYS' EYES ONLY

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1 A. I think that's right.

2 Q. And so could the fact that once
3 consumers have purchased Amazon Coins, they're
4 stuck with them, lead Amazon to try to offer
5 significant discounts to get people to buy
6 Amazon Coins?

7 A. I don't think so.

8 Q. Have you analyzed that issue at all?

9 A. No, but that -- it just doesn't sound
10 reasonable as an economic matter.

11 Q. All right. Last line here.

12 You looked -- in your Amazon Coins
13 model, you looked at the share of consumer
14 discounts for purchases on Amazon's App Store
15 as a third-party App Store, not on Amazon
16 devices; right?

17 A. Correct.

18 Q. And why did you do that?

19 A. Because I -- I felt that the best
20 competitive benchmark would be how an
21 independent App Store would price on someone
22 else's platform.

23 Q. And you made that decision even
24 though you would agree that the vast majority
25 of Amazon's revenue from the App Store and

1 discounts were [REDACTED] ?

2 A. I don't know if it's the vast
3 majority. I do know that Amazon is at a hard
4 time because of challenged conduct here from
5 getting on to Android phones, but I haven't
6 done a decomposition of the -- of where
7 it's -- where its App Store revenues are
8 coming from.

9 MR. RAPHAEL: Okay. Why don't we
10 take a break now.

11 THE VIDEOGRAPHER: Going off the
12 record. The time is 12:26.

13 (Whereupon, a luncheon recess was
14 taken at the above time.)

15 THE VIDEOGRAPHER: Going back on
16 the record. The time is 13:03.

17 BY MR. RAPHAEL:

18 Q. All right.

19 Dr. Singer, let's go back to your
20 regression that you ran in connection with
21 your Logit model.

22 That regression finds a
23 correlation between the price that a developer
24 charges and the share of that developers' app
25 category?

ATTORNEYS' EYES ONLY

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1 A. Close. It's just -- yeah, the share
2 of that developer within its category, that's
3 right, its market share.

4 Q. Right.

5 And so what the regression is
6 looking at is if the developer changes its
7 price, does that reduce its share of the app
8 category; right?

9 A. Right. Implying that -- that there
10 would be substitution away from that app
11 towards what consumers perceive to be
12 substitutes.

13 Q. Right.

14 And does the regression that you
15 ran that looks at the change in price and its
16 effect on the developer's share of its
17 category tell you anything about where the
18 substitution, as you put it, comes from?

19 A. Where it comes from is, of course,
20 the app who is raising the price. Did you
21 mean to say where it's going? I don't --
22 where it's coming from --

23 Q. Ah, thank you for that.

24 A. Okay.

25 Q. I'll ask a better question.

ATTORNEYS' EYES ONLY

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1 A. Okay.

2 Q. So your regression that you ran in
3 connection with your Logit model, does it tell
4 you where, when a developer raises its price,
5 where consumers will substitute to within the
6 category?

7 A. This -- this particular model, or at
8 least for this purpose of a model, or this
9 stage of the model, it is simply telling you
10 that the developer loses share. But once you
11 know that the model fits and is the best
12 demand system for the data, you can infer that
13 users are moving around the category in
14 proportion to the market share of the -- of
15 the other goods.

16 Q. Okay.

17 But the regression is one of the
18 things you used to determine the fit of the
19 model; right?

20 A. Correct.

21 Q. Okay.

22 And the regression, itself, does
23 not tell you when a developer raises its price
24 or lowers its price, I guess, to which apps do
25 the other -- do the consumers substitute;

ATTORNEYS' EYES ONLY

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1 right? It doesn't tell you that?

2 A. Correct.

3 Q. Do you agree that the relevant
4 product market should include all competitive
5 constraints?

6 A. No.

7 Q. Is product quality --

8 A. Can I -- also, can I just say why? I
9 mean I --

10 Q. Sure.

11 A. Just to be clear, you don't need to
12 include all competitive constraints because
13 there could be some very weak constraints that
14 don't prevent the exercise of market power.

15 So if the guidelines are telling
16 you to include only those that are necessary
17 in order to effectuate a price increase over
18 competitive levels, so that was the only part
19 I was pushing back on.

20 It's not all competitive
21 constraints, right? It's not every one under
22 the sun. And maybe we could define what you
23 mean by competitive. But -- but I took it to
24 mean literally any competitive including weak,
25 right? We don't need weak constraints to be